BLM Technical Note 385

Pipe-Laying Techniques On Open Range Land

A New Method for Laying Heavy-Duty Pipe

United States Department of the Interior
Bureau of Land Management

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A New Method for Laying Heavy-Duty Pipe

by

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PIPE-LAYING TECHNIQUES ON OPEN RANGE LAND

Most pipelines that furnish livestock water on the open range are constructed of the standard black plastic or polyethylene pipe with a PSI rating which varies from 80 to 160. This kind of pipe can be readily installed by using a ripper pipe-laying attachment operated hydraulically from a crawler tractor.

However, occasions arise when a heavier duty pipe is needed which will withstand pressures in excess of 160 PSI. In the past, the installation of this pipe, due to its rigidity, has generally required open trench equipment such as a backhoe or a ditch-witch. This normally includes a three-phase operation: excavation, coupling of pipe joints and placing in trench, and finally the backfill phase.

During the past six years the Richfield BLM District, located in South Central Utah, has been installing high pressure PVC pipe using a more efficient procedure, similar to the method for laying the more pliable black plastic pipe.

As the need to install heavier duty pipe increased, the District decided to try the new method. So, in 1982, Glenn V. Whatcott, Field Project Foreman, designed an implement similar to the polyethylene pipe-layer, but with a very gentle arc in the tube which the pipe feeds through in reaching the desired underground depth.

The unit performed well on a trial basis and since 1982, this method has proven successful while installing some 81 miles of high pressure line in various locations and site conditions throughout the District. After pre-ripping the pipeline route and coupling the pipe joints together, the pipe is laid and covered in one operation. Most of the 81 miles have been schedule 40 with a PSI rating of 330. Pipe diameter has varied from 1-1/4 to 2 inches with the most common size being 1-1/2 inches. Perhaps the greatest challenge occurred during the summer of 1987 when five miles of a 15-mile project near Callao in Northwestern Juab County required schedule 80 (470 PSI),
1-1/2 inch pipe.

There was some concern as to whether the extra heavy duty pipe would be sufficiently flexible to feed through the implement without breaking. One day when the temperatures dipped into the 50's, the project was shut down until conditions became more favorable. But other than the delay in time, the project went without a hitch. Ideal temperature for this operation is 65° F. and above; although there have been cases with the smaller 1-1/4 inch schedule 40 pipe being installed with temperatures in the 50's without difficulty.

Rocky soil conditions have also caused some concern. In 1983, in cooperation with the Soil Conservation Service and livestock permittees, a seven-mile section of schedule 40 line was installed about 10 miles northwest of Scipio. The upper 1/2 mile was located in rocky alluvium at the base of the mountain. The equipment had to slow down considerably, but no problems were experienced with the pipe snapping due to sudden erratic movements of the implement. About the only concern under these conditions so far has been lack of desired depth.

Comparative Costs

This analysis compares the open trench method (using a backhoe) with the new implement, both being done by BLM crews and equipment. Figures are based on installing a two-mile section of pipeline to a 36-inch depth.

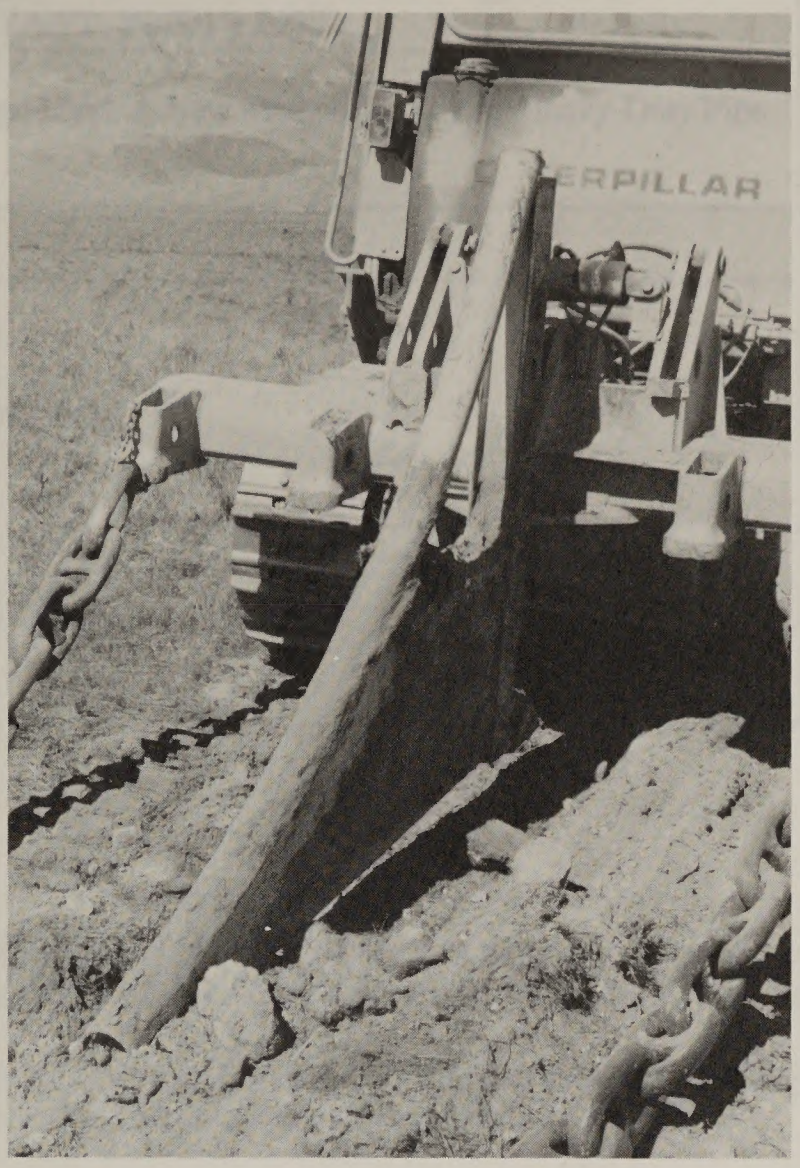
Open Trench Method

Equipment:		
Backhoe - 32 hours @ $15.20	=	$ 486.40
Labor:		
8 man days @ $110.00 (equipment operator - 4 days, companion operator - pipe gluer - 4 days, 3 days to excavate, 1 day to install pipe and backfill)	=	$ 880.00
Total		$1366.40

New Implement

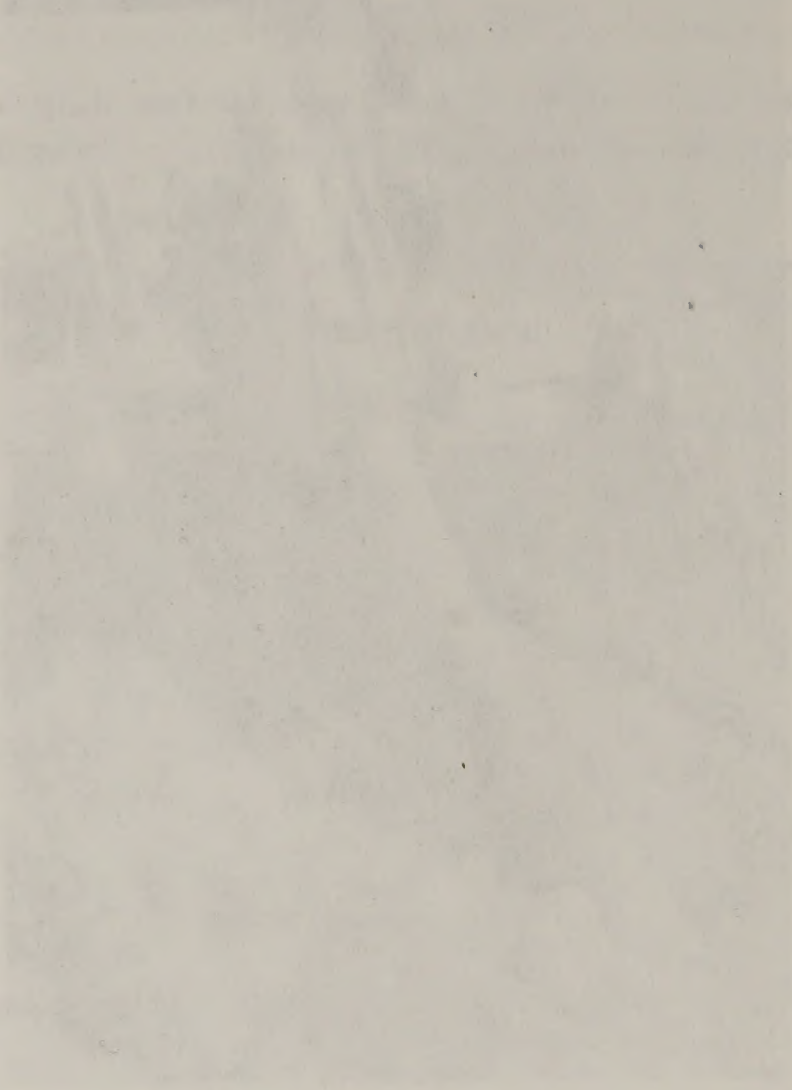
Equipment:		
D-6 dozer w/pipe-layer - 8 hours @ 22.60	=	$ 180.80
Labor:		
4 man days @ 110.00 (one equipment operator to pre-rip and lay pipe, two men to couple joints and one truck driver)	=	$ 440.00
Total		$ 620.80

In addition to a substantial savings in time and money, the soil-plant disturbance is about half when using the pipe laying implement. Normally, the disturbance can be confined to about 10 feet or width of the dozer tracks; whereas the open trench method would normally require about 15 feet. This is an important consideration, especially in areas where environmental values dictate minimal surface disturbance.



This pipe-laying unit attaches directly to the hydraulic-operated ripper tooth of a crawler tractor. Vertical height is 60 inches and horizontal length is 80 inches. Cost for this unit is about $450.

The pre-coupled pipe is fed through a series of guides and rollers mounted on dozer and cab of tractor. Pipe finally enters ground through a 3-1/2- inch tube shaped into a gentle arc. Depth capability is governed by ripper tooth assembly. This particular line is going in at a depth of approximately three feet. Although not shown in this photo, a twenty-foot piece of anchor chain is dragged in a "U" pattern behind pipe-layer to pull soil berm back into the furrow.



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Installation of heavy duty-pipe to furnish livestock water has in the past required a three-phase procedure. This paper decribes a new, more efficient installation method which has been used successfully during the past six years.

The new method saves substantial amounts of time and money. It also decreases soil and plant disturbance by about fifty percent. This is important in areas where environmental values dictate minimal surface disturbance.

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